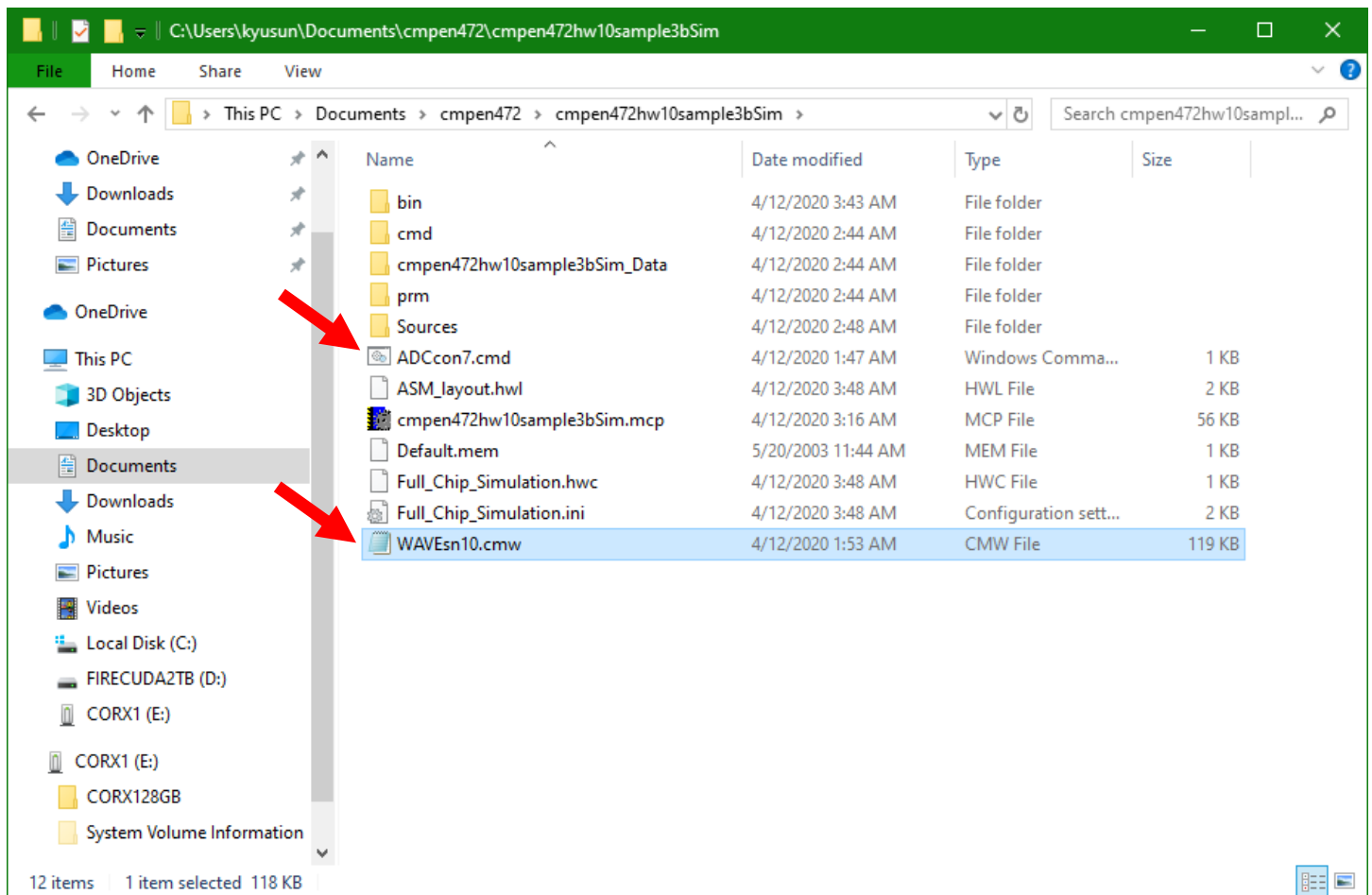


CMPEN 472, Homework 11, CodeWarrior Full Chip Simulator (Debugger) Guide

This is an additional Guide over the previous [Homework 10 CodeWarrior Full Chip Simulator Guide](#), for the Homework 11.

In order to simulate Analog-to-Digital Converter (ADC) with CodeWarrior, a few additional steps are necessary to generate an analog signal. Mainly one will need to issue a CodeWarrior command to connect the ADC input pin to a signal generator, and provide a signal wave file. As an example, the Homework 11 sample program project is created following the CMPEN 472 CodeWarrior Full Chip Simulator Guide. Copy the Homework 11 sample program source, click 'Make' and then 'Debug'. Add and setup the Terminal component in the simulator. You may remove the Data window and Procedure window, but you need to keep the Command window in the simulator. Be sure to SAVE the Debug/Simulator Configuration, then quit the Debug/Simulator, and restart it - for your simulator setup to take effect. Before you start the simulation to run your program, take the following additional steps:

Copy the two files 'ADCcon7.cmd' and 'WAVEsn10.cmw' files to your project folder.



Right click on the 'Command' window. Select Execute File option.

True-Time Simulator & Real-Time Debugger C:\Users\kyusun\Documents\cmpe472\cmpe472hw10sample3bSim\Full_Chip_Simulation.ini

File View Run HCS12 ECS Component Command Window Help

Source C:\Users\kyusun\Documents\cmpe472\cmpe472hw10sample3bSim\bin\main.dbg Line: 60

```
*****
; code section
ORG $3100
Entry
LDS #Entry ; initialize the stack pointer

ldd #0001 ; For SIMULATION, Set SCI Baud Register = 0001 =
std SCIBDH ; SCI port baud rate change
ldaa #0C ; Enable SCI port Tx and Rx units
staa SCICR2 ; disable SCI interrupts

; ATD initialization
LDA #11000000 ; Turn ON ADC, clear flags, Disable ATD inte
STAA ATDCTL2
LDA #00001000 ; Single conversion per sequence, no FIFO
STAA ATDCTL3
; LDA #01000111 ; 10bit, ADCLK=24MHz/16=1.5MHz, sampling ti
; STAA ATDCTL4
LDA #10000111 ; 8bit, ADCLK=24MHz/16=1.5MHz, sampling time
STAA ATDCTL4 ; for SIMULATION
```

Assembly

Entry

3100	CF3100	LDS	#12544
3103	CC0001	LDD	#1
3106	5CC8	STD	0xC8
3108	860C	LDA	#12
310A	5ACB	STAA	0xCB
310C	86C0	LDA	#192
310E	5A82	STAA	0x82
3110	8608	LDA	#8
3112	5A83	STAA	0x83
3114	8687	LDA	#135
3116	5A84	STAA	0x84
3118	CE3001	LDD	#12289

Register

HC12 CPU Cycles: 0 Auto

D	CBCB	A	CB	B	CB
IX	CBCB	IY	CBCB		
IP	3100	PC	3100	PPAGE	0
SP	CBC9	CCR	SXIN2VC		

Terminal

Visualization Tool

Display Mode

Memory

003000	00 48 65 6C 6C 6F 2C 20	.Hello,
003008	74 68 69 73 20 69 73 20	this is
003010	61 6E 20 41 44 43 20 74	an ADC t
003018	65 73 74 69 6E 67 20 70	esting p
003020	72 6F 67 72 61 6D 2E 00	rogram..
003028	4F 6E 65 20 41 54 44 20	One ATD
003030	63 6F 6E 76 65 72 20 70	conver p
003038	65 72 20 65 61 63 68 20	er each
003040	45 6E 74 65 72 20 4B 65	Enter Ke
003048	79 20 68 69 74 2E 00 59	y hit..Y
003050	6F 75 20 6D 61 79 20 74	on mav t

Command

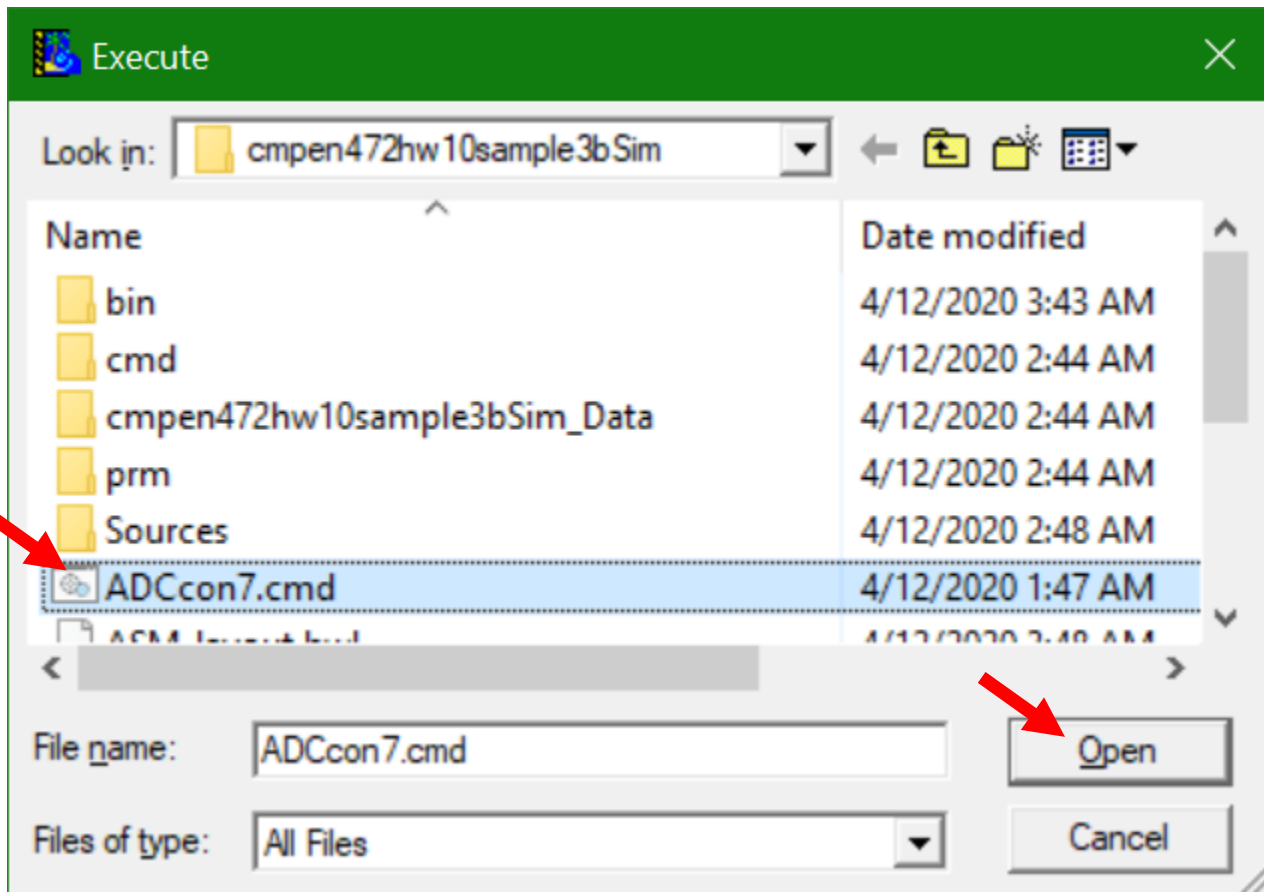
```
executing .\cmd\Full_Chip_Simulation_postload.cmd

!// After load the commands written below will be executed
done .\cmd\Full_Chip_Simulation_postload.cmd

Postload command file correctly executed.

in>
```

For Help, press F1 24.000000 MHz 0 MC9S12C32 done .\cmd\Full_Chip_Simulation_postk



Click on Terminal window. And run program.

True-Time Simulator & Real Time Debugger C:\Users\kyusun\Documents\cmpen472\cmpen472hw10sample3bSim\Full_Chip_Simulation.ini

File View Run HCS12 ECS Component Terminal Window Help

Source C:\Users\kyusun\Documents\cmpen472\cmpen472hw10sample3bSim\bin\main.dbg Line: 60

```
;*****  
; code section  
ORG $3100  
Entry  
LDS #Entry ; initialize the stack pointer  
  
ldd #$0001 ; For SIMULATION, Set SCI Baud Register = $0001 =  
std SCIBDH ; SCI port baud rate change  
ldaa #$0C ; Enable SCI port Tx and Rx units  
staa SCICR2 ; disable SCI interrupts  
  
; ATD initialization  
LDAA #$11000000 ; Turn ON ADC, clear flags, Disable ATD inte  
STAA ATDCTL2  
LDAA #$00001000 ; Single conversion per sequence, no FIFO  
STAA ATDCTL3  
; LDAA #$01000111 ; 10bit, ADCLK=24MHz/16=1.5MHz, sampling ti  
; STAA ATDCTL4  
LDAA #$10000111 ; 8bit, ADCLK=24MHz/16=1.5MHz, sampling time  
STAA ATDCTL4 ; for SIMULATION
```

Assembly Entry

3100	CF3100	LDS	#12544
3103	CC0001	LDD	#1
3106	5CC8	STD	0xC8
3108	860C	LDAA	#12
310A	5ACB	STAA	0xCB
310C	86C0	LDAA	#192
310E	5A82	STAA	0x82
3110	8608	LDAA	#8
3112	5A83	STAA	0x83
3114	8687	LDAA	#135
3116	5A84	STAA	0x84
3118	CE3001	LDD	#12289

Register HC12 CPU Cycles: 0 Auto

D	CBCB	A	CB	B	CB
IX	CBCB	IY	CBCB		
IP	3100	PC	3100	PPAGE	0
SP	CBC9	CCR	SX#IN2VC		

Terminal

Command

```
executing C:\Users\kyusun\Documents\cmpen472\cmpen472hw10sample3bSim\ADCcon7.cm  
  
!openio Pinconn  
!openio Signal  
!setsignalfile 0 "WAVEsn10.cmw"  
!connect "SignalGenerator0.SignalPin", "Atd.PAD7"  
done C:\Users\kyusun\Documents\cmpen472\cmpen472hw10sample3bSim\ADCcon7.cmd  
  
in>
```

Visualization Tool

Display Mode

Memory

003000	00 48 65 6C 6C 6F 2C 20	.Hello,
003008	74 68 69 73 20 69 73 20	this is
003010	61 6E 20 41 44 43 20 74	an ADC t
003018	65 73 74 69 6E 67 20 70	esting p
003020	72 6F 67 72 61 6D 2E 00	rogram..
003028	4F 6E 65 20 41 54 44 20	One ATD
003030	63 6F 6E 76 65 72 20 70	conver p
003038	65 72 20 65 61 63 68 20	er each
003040	45 6E 74 65 72 20 4B 65	Enter Ke
003048	79 20 68 69 74 2E 00 59	y hit..Y
003050	6F 75 20 6D 61 79 20 74	on mav t

For Help, press F1 24.000000 MHz 0 MC9S12C32 done C:\Users\kyusun\Documents\cmp

As your program is running, hit enter key. You may keep hitting enter keys, to get the analog signal value.

The screenshot displays the True-Time Simulator & Real-Time Debugger interface with the following components:

- Source Window:** Shows the assembly code for `C:\Users\kyusun\Documents\cmpe472\cmpe472hw10sample3bSim\bin\main.dbg`. The code includes initialization for the SCI baud register, SCI port Tx and Rx units, and ATD initialization (turning on ADC, clearing flags, disabling ATD interrupts, and setting conversion parameters).
- Assembly Window:** Displays the assembly code for the `Entry` label, showing instructions like `LDS #12544`, `LDD #1`, `STD 0xC8`, `LDA #12`, `STAA 0xCB`, `LDA #192`, `STAA 0x82`, `LDA #8`, `STAA 0x83`, `LDA #135`, `STAA 0x84`, and `LDD #12289`.
- Register Window:** Shows the register values for the HC12 CPU. The CPU Cycles are 7204171. The registers are: D (CBCB), A (CB), B (CB), IX (CBCB), IY (CBCB), IP (3100), PC (3100), PPAGE (0), and SP (CBC9), CCR (SXHIN2VC).
- Terminal Window:** Displays the output of the program, which is a sine wave signal. The output is: `Hello, this is an ADC testing program.` followed by a series of numbers: `$7A`, `$29`, `$01`, `$15`, and a cursor.
- Visualization Tool Window:** Shows a graph of the signal, with a green line representing the sine wave.
- Command Window:** Shows the command prompt where the user has entered `!openio Pinconn`, `!openio Signal`, `!setsignalfile 0 "WAVEsn10.cmw"`, `!connect "SignalGenerator0.SignalPin", "Atd.PAD7"`, `done C:\Users\kyusun\Documents\cmpe472\cmpe472hw10sample3bSim\ADCcon7.cmd`, `STARTED`, `RUNNING`, and `in>`.
- Memory Window:** Shows the memory dump, displaying the ASCII representation of the signal values: `.Hello, this is an ADC testing program.. One ATD converter each Enter Key hit..Y ou may t`.

The status bar at the bottom indicates the CPU frequency is 24.000000 MHz, the timer is 7'324'354, the device is MC9S12C32, and the simulation is RUNNING.

If you see the numbers printed on the Terminal is changing, your sample program is working! And if you look at the numbers carefully, you will notice it is sine wave anywhere from 10Hz to 100Hz range.